

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/723,898

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Applicant: Mead et al.

Group Art Unit: 1773

Examiner: Kevin R. Kruer

Title: PLASTISOL COATING CONTAINING REFLECTIVE PIGMENTS,
METHOD OF PREPARING COATING ON A SUBSTRATE, AND
PRODUCTS WITH SUCH COATINGS

Attorney Docket: 0906S-000336 (IN-5692)

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Commissioner for Patents
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Reply Brief Under 37 C.F.R. § 41.41

Sir:

In response to the Examiner's Answer having a notification date of June 18, 2008, Appellants file this Reply Brief. The Examiner's Answer included a new ground of rejection. Appellants request that the appeal be maintained and further include argument addressing the new ground of rejection within the requirements of 37 C.F.R. § 41.37(c). No amendment or new evidence accompanies the present Brief.

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Real Party in Interest

The real party in interest is BASF Corporation, having a place of business at 26701 Telegraph Road, Southfield, Michigan 48034, to which the inventors have assigned all rights in this invention. The assignment was recorded in the United States Patent and Trademark Office on April 19, 2004, at reel/frame: 014528/0943.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 7, 10, 11, 13, 14, 16-20, and 25-26 are pending and stand finally rejected. Claims 1-6, 8, 9, 12, 15, and 21-24 are cancelled. This appeal is taken as to all of the rejected claims.

Status of Amendments

There have been no amendments since the final rejection.

Summary of Claimed Subject Matter

Claims 7, 11, 16, 19, and 20 are independent claims. Independent claim 7 is drawn to a film that is applied to an article, such as architectural siding, in order to reflect the infrared (IR) component of sunlight to thereby reduce heat build-up. Page 2, lines 8-10. The film is formed by applying and coalescing a plastisol composition to a substrate comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment. Page 2, line 20 to page 3, line 8; page 7, line 22 to page 8, line 1. The amount of infrared-reflective pigment is sufficient so that there is essentially no transmittance of light of near infrared wavelength through the film. Page 7, lines 16-19. The film is from about 2 mils to about 5 mils thick. Page 8, lines 7-8. Claims 10, 25, and 26 are dependent on claim 7.

Independent claim 11 is drawn to an article of architectural siding comprising an outer coating layer comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment. Page 7, line 22 to page 8, line 1; page 8, lines 14-15. The outer coating layer is from about 2 mils to about 5 mils thick, and the infrared-reflective pigment is in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the layer. Page 7, lines 16-19; page 8, lines 7-8. Claims 13 and 14 are dependent on claim 11.

Independent claim 16 is drawn to an article of architectural siding formed by a method that includes forming a coating layer on a backing material. A layer of a plastisol composition is applied to the backing material and fused with heat, the layer being about 2 mils to about 5 mils thick and comprising a poly(vinyl chloride) polymer, at

least one plasticizer, and an infrared-reflective pigment. Page 7, line 21 to page 8, line 8. The coating layer is removed from the backing material and laminated to a piece of architectural siding material, and the laminated architectural siding material is shaped into a desired profile. Page 8, lines 9-15; page 9, lines 2-6. Claims 17 and 18 are dependent on Claim 16.

Independent claim 19 claims a coated article including at least one coating layer. Page 4, lines 8-12. The coating layer comprises a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the layer. The layer is an outer layer from about 2 mils to about 5 mils thick. Page 4, lines 11-12. The article is a piece of vinyl siding or a trim piece for vinyl siding. Page 4, line 11.

Independent claim 20 is drawn to an article having on it a layer of a plasticized poly(vinyl chloride) polymer, which includes a sufficient amount of an infrared reflective pigment so that there is essentially no transmittance of light of near infrared wavelength through the layer. Page 4, lines 8-10 and page 7, lines 16-19. The article is vinyl siding or trim and the layer is about 2 to about 5 mils thick. Page 9, lines 6-8.

Grounds of Rejection to be Reviewed on Appeal

Three separate 35 USC 103(a) rejections are to be reviewed on appeal:

- I. Claims 7, 10, 11, 13, 16, 17, 19, and 20 are rejected under 35 USC § 103(a) as allegedly obvious over Ravinovitch, U.S. Patent No. 4,424,292, in view of Krafft, U.S. Patent No. 4,056,397;
- II. Claims 14 and 18 are rejected under 35 USC § 103(a) as allegedly obvious over Ravinovitch in view of Krafft and Sullivan, U.S. Patent No. 6,416,868; and
- III. Claims 7, 10, 11, 13, 16, 17, 25, and 26 are rejected under 35 USC § 103(a) as allegedly obvious over Stamper, U.S. Patent No. 4,574,103, in view of Krafft, U.S. Patent No. 4,056,397.

Argument

- I. The combination of Ravinovitch with Krafft cannot establish a *prima facie* case of obviousness for claims 7, 10, 11, 13, 16, 17, 19, and 20 as the combination is improper since Krafft is nonanalogous art, the combination fails to include or suggest the claimed film or layer thickness, and there is no apparent reason for a skilled artisan to modify the prior art to include the missing film or layer thickness.

Combination of Ravinovitch in view of Krafft is improper as the Krafft reference is not reasonably related to the field of endeavor or the problem faced by Appellants, as required by *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992) (reference must be in the same field of endeavor or reasonably pertinent to the particular problem with which the inventor was concerned). In particular, a person of ordinary skill in the art would not look to a reference providing a visible light proof seal for photographic film when constructing or modifying a layer containing infrared-reflective pigment. The Krafft reference is also not relevant to reducing transmittance of infrared light in order to reduce heat build-up in architectural siding material.

The Kraft teachings are directed towards photographic monosheet material (for use in cameras) for a dye diffusion transfer process. Kraft abstract and col. 1, lines 4-5. The photographic monosheet material contains a light reflecting pigment layer. Kraft col. 2, lines 49-50. The light reflective pigment layer is designed to reflect visible light in order to mask the image silver and form a light proof seal. Kraft col. 8, line 4 et seq.

Masking and forming a light proof seal in photographic film is not in the same field of endeavor as infrared-reflecting vinyl polymer compositions designed to reduce heat build-up. Furthermore, the problem of masking and blocking visible light in photographic film is not analogous to reflecting infrared light to reduce heat build-up. A skilled artisan viewing the Ravinovitch reference would not look to photographic film having visible light masking and blocking pigment layers as used within a camera, as the photographic monosheet material would not logically commend itself to addressing infrared reflectance of structural siding nor would it address the problem of heat build-up. A reference that is neither in the art of the Appellants' invention nor directed to the problem the Appellants sought to solve is nonanalogous art that cannot support a *prima facie* rejection for obviousness. Consequently, the combination of Ravinovitch and Krafft is improper in the present case and cannot be used to establish a case of obviousness.

Moreover, even if Krafft was analogous art, the combination of Ravinovitch in view of Krafft still would not teach or suggest the claimed thickness found in claims 7, 10, 11, 13, 16, 17, 19, 20, and 24. The prior art also does not provide any reason for making a film or layer of the claimed thickness or applying it to a substrate and does not identify why such modification may be desirable. What is more, the Examiner has not explicitly identified an apparent reason based on the general knowledge in the art as to why a skilled artisan would modify the reference teachings to recreate Appellants' claims or expect success in doing so.

To establish a *prima facie* case of obviousness, the combined prior art references must teach or suggest all the claim limitations. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). If the references are missing claimed features, there must be

some apparent reason either in the references or the general knowledge in the art to modify the references to include the missing subject matter. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (2007). The Examiner should make the apparent reason to combine or modify the references explicit to facilitate review. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. at 1740-41, 82 USPQ2d at 1396; and see *In re Kahn*, 441 F3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning to support the legal conclusion of obviousness.").

The present reference combination fails to teach a film or layer from about 2 mils to about 5 mils thick. The Ravinovitch patent teaches compositions for making vinyl house siding where the siding may be all one piece or an extruded composite of a capstock over a substrate, with the capstock or siding containing an infrared-reflecting pigment. Ravinovitch col. 3, lines 13-22. The various capstock samples of Example I in Ravinovitch have thicknesses of 0.45 in., which equals 450 mils (1 mil = 0.001 inch). Ravinovitch col. 4, line 58 to col. 5, line 1. Ravinovitch does not teach or suggest any other capstock thicknesses, and the reference does not provide any reason or motivation for changing the capstock thickness. Consequently, the Ravinovitch patent does not teach the claimed thickness.

The Krafft patent does not teach or suggest vinyl capstock of any thickness whatsoever. Instead, the Krafft patent teaches photographic monosheet material that contains a light reflecting white pigment layer designed to reflect visible light in order to mask the image silver and form a light proof seal. Krafft abstract; col. 1, lines 4-5; col. 2,

lines 49-50. The person of ordinary skill in the vinyl siding art would not view photographic material as equivalent to architectural siding, or the Kraft patent as instructive for architectural siding. The Examiner and Appellants' agree that, "at best, Krafft informs the skilled artisan that increasing a pigment layer thickness can increase reflectivity." Advisory Action from Oct. 17, 2006, page 2, lines 15-18.

As such, the combination of the Ravinovitch and Krafft disclosures appears to involve modifying the vinyl composition containing the infrared-reflective pigment (as per Ravinovitch) by increasing the thickness of the material in order to increase reflectance (as per Krafft). Taking the Ravinovitch capstock and applying the teachings of Krafft, the skilled artisan would be led to make a capstock having a thickness of greater than 450 mils. Viewing the reference teachings as a whole, the combination is silent regarding a film or layer of about 2 mils to about 5 mils thick, as found in Appellants' claims. Furthermore, the combination is silent regarding decreasing the thickness of a material, which presumably would decrease reflectance as per the teachings of Krafft.

The claims rejected by the combination of Ravinovitch and Krafft (with the exception of claim 16) also include the express feature that the film or layer has an amount of IR-reflective pigment such that there is "essentially no transmittance of light of near infrared wavelength." Therefore, these claims require an amount of pigment to prevent essentially all transmittance of IR light, in addition to the film or layer being from about 2 mils to about 5 mils thick. A skilled artisan, viewing the straightforward combination of Ravinovitch and Krafft, would be led to increase the thickness of the 450 mil capstock of Ravinovitch until there is no transmittance of infrared light, as alleged in

the rejection. Such modification would result in a construct that is unlike the presently claimed film or layer that is from about 2 mils to about 5 mils thick.

The present invention provides the benefits of including the IR-reflective pigment in a thin film/layer (from about 2-5 mils) to effectively reduce heat build-up on the siding while at the same time minimizing the amount of material and IR-reflective pigment that must be applied to the siding, thereby reducing costs. For example, having infrared-reflective pigment throughout a vinyl siding composition or within a thick layer of vinyl capstock (as per Ravinovitch) can add significant expense. Present application, page 2, lines 10-11. The present invention provides a solution by including the infrared-reflective pigment in a thin film/layer (as claimed, from about 2-5 mils) to effectively reduce heat build-up on the siding while at the same time minimizing the amount of material and infrared-reflective pigment that must be applied to the siding. A building can thus be protected by applying siding having the present layer or film. Page 4, lines 13-16. In addition, the present invention solves issues relating to tensile properties, among other properties, caused by concentrations of infrared-reflective pigment that would be necessary to achieve the desired reflectance when the pigment is present throughout the vinyl siding. Present application, page 2, lines 11-14.

The Examiner alleges that "it would have been obvious to one of ordinary skill in the art to add sufficient pigment in order to block the desired amount of infrared energy. The motivation for doing so would have been to reduce heating of the article." Examiner's Answer dated July 18, 2008, page 5, lines 15-18. However, a skilled artisan taking capstock (as per Ravinovitch) with the alleged motivation to block the desired amount of infrared energy would simply modify the capstock by increasing the thickness

(as per the Krafft teaching) to further block transmittance of infrared light. Nothing in the references or in the Examiner's rejection suggests modifying the combination by reducing the thickness of the Ravinovitch capstock two orders of magnitude (e.g., from 450 mils down to about 2 to 5 mils) while simultaneously using an amount of IR-reflecting pigment so that there is essentially no transmittance of infrared light. Only the present claims recite a thin film/layer that blocks infrared light, consequently saving on the expense of infrared-reflective pigment and maintaining the tensile properties of the underlying siding by separating the pigment composition from the siding composition.

Nowhere in the Ravinovitch and Krafft references or in the Examiner's rejection is there found any appreciation regarding the problems solved by Appellants' claims. Nor is there any reason or desirability identified by which a skilled artisan would shrink the thickness of the Ravinovitch capstock by over two orders of magnitude while maintaining infrared-reflectance. “[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F3d 977, 988 (Fed. Cir. 2006). In this case, the Examiner has failed to identify support in the Ravinovitch and Krafft reference combination by which a skilled artisan would recreate Appellants' claims.

In effect, the Ravinovitch patent in view of the Krafft patent teaches away from the present claims. If a skilled artisan were to combine Ravinovitch with the Krafft teachings, the skilled artisan would take the capstock from Ravinovitch, and applying the result effective variable from Krafft (i.e., increasing thickness increases reflectance), would subsequently increase the thickness in order to optimize the reflection spectra of the layer to the point that there is no transmittance of IR light. Since the capstock disclosed

in Ravinovitch is 450 mils, the skilled artisan would only be motivated to increase the thickness, thereby producing capstock greater than 450 mils. "A *prima facie* case of obviousness can be rebutted if the applicant . . . can show 'that the art in any material respect taught away' from the claimed invention." *In re Geisler*, 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997) (quoting *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (C.C.P.A. 1974)). "A reference may be said to teach away when a person of ordinary skill, upon reading the reference . . . would be led in a direction divergent from the path that was taken by the applicant." *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360, 52 USPQ2d 1294, 1298 (Fed. Cir. 1999). In this case, as in *Geisler* and *TecAir*, the references teach away from Appellants' invention.

In sum, the Examiner fails to provide a reason based on the general knowledge in the art for a skilled artisan to modify the combination to include a film or layer from about 2 mils to about 5 mils thick. In the present case, the Examiner's rejection lacks any reason based on the general knowledge in the art that supports why a skilled artisan would modify the Ravinovitch capstock by reducing its thickness by two orders of magnitude and further use an amount of IR-reflective pigment to provide essentially no transmittance of IR light. Accordingly, a *prima facie* case of obviousness cannot be established using the cited references as the combination does not disclose all the claimed features. In addition, no general knowledge in the art is provided that would account for the noted deficiencies. Claims 7, 10, 11, 13, 16, 17, 19, and 20 include a nonobvious thickness feature absent in the art of record and are therefore patentable.

In addition to the preceding remarks, Appellants submit the following rebuttal to Section (10) I of the Examiner's Answer, pages 8-10.

With respect to the combination of Ravinovitch and Krafft, the Examiner ignores the example provided in Ravinovitch and alleges the silence of the Ravinovitch reference somehow suggests a layer about 2 to 5 mils thick. Appellants disagree. Indeed, the “[t]eachings of Ravinovitch are not limited to the examples disclosed therein but for all that it reasonably discloses.” Examiner’s Answer page 8, lines 9-11. And nowhere in Ravinovitch is there disclosed a film or layer about 2 to 5 mils thick. The Ravinovitch reference (including Krafft) is devoid of any inference with respect to modification of the only capstock example to reduce the thickness over 100-fold. This is not a reasonable interpretation of the reference teachings.

The Examiner apparently tries to rectify this deficiency by alleging that “the skilled artisan would have known capstocks typically have a thickness near the claimed thickness range,” and cites U.S. Pat. App. Pub. Nos. 2002/0177685 and 2002/0147246 as apparent support, which are not part of the present rejection. Page 8, lines 13-14 of the Examiner’s Answer from July 18, 2008. A careful reading of these references however reveals not a single disclosure of a film or layer from about 2 mils to about 5 mils, and neither of these references contemplates use of an infrared-reflective pigment. Example 1 of 2002/0177685 discloses capstock of 0.2 mm, which equals 7.87 mils and paragraph [0068] of 2002/0147246 also discloses capstock of about 0.2 mm, which again equals about 7.87 mils. Thus, the Examiner has failed to provide any instance of a film or layer of about 2 to 5 mils and has failed to substantiate why it would be reasonable for a skilled artisan to modify and reduce the Ravinovitch capstock over 100-fold in thickness.

Finally, the alleged optimization of the amount of pigment by increasing thickness (as per Krafft) to block the desired amount of IR energy (as per Ravinovitch) still does not provide any means by which the skilled artisan would provide capstock of about 2 to 5 mils that has essentially no transmittance of light of near infrared wavelength.

In view of the preceding remarks, the 35 U.S.C. § 103 rejection based on Ravinovitch in view of Krafft should be REVERSED.

II. Claims 14 and 18 are patentable over the cited references because the Sullivan disclosure fails to cure the deficiencies of the combination of the Ravinovitch and Krafft patents.

Dependent claims 14 and 18 are patentable over the combination of Ravinovitch in view of Krafft and further in view of Sullivan because the Ravinovitch-Kraft combination is improper since Krafft is nonanalogous art, the combination does not teach the claimed film or layer thickness or the claimed amount of IR-reflective pigment, and the addition of Sullivan for the disclosure of aluminum does not account for these noted deficiencies. The improper addition of Krafft is illustrated in the preceding section. Briefly, Krafft is nonanalogous art as the reference is not related to reducing heat build-up using infrared-reflective pigment. Moreover, even if Krafft is combined with Ravinovitch, further addition of Sullivan fails to cure the aforementioned deficiencies, namely combination of the three references still lacks any teaching or reason to construct a film or layer of 2 to 5 mils in thickness.

Sullivan is provided for teaching plastic, rubber, paint and other compositions that contain infrared-reflective pigments that are used to coat various substrates including metal. Sullivan col. 6, lines 47-53. The Examiner cites Sullivan as disclosing metal siding. The alleged motivation for including Sullivan in the combination of Ravinovitch and Krafft is that Sullivan teaches infrared light induced heat buildup is an issue on metal substrates as well as plastic substrates. Examiner's Answer dated July 18, 2008, page 6, lines 6-8.

However, as demonstrated in the preceding section, a skilled artisan modifying the teachings of Ravinovitch with the proposition from Krafft would produce a capstock layer of greater than 450 mils in any attempt to optimize reflectivity; i.e., increasing thickness to increase reflectivity, as Krafft teaches. Nothing in the combination provides any reason by which a skilled artisan would modify the teachings therein to make a coating layer of about 2-5 mils in thickness that has an amount of IR-reflective pigment providing essentially no transmittance of IR light. Likewise, no reason is provided by the Examiner based on the general knowledge in the art to do the same. The Sullivan reference is also silent on these subjects; Sullivan is used solely for teaching the coating of metallic substrates. Thus, no combination of these three references would produce a film or coating layer from about 2 mils to about 5 mils that is applied to an aluminum article and that provides essentially no transmittance of light of near infrared wavelength, as found in claims 14 and 18. These claims are therefore nonobvious and patentable over the art of record.

In addition to the preceding remarks, Appellants submit the following rebuttal to Section (10) II of the Examiner's Answer, page 10.

With respect to claims 14 and 18, the Examiner still has not established a route by which a skilled artisan would so modify the Ravinovitch, Krafft, and Sullivan references to arrive at the present claims. In particular, there is no substantiated basis for a person of ordinary skill in the art to modify the Ravinovitch capstock by reducing its thickness over 100-fold, as per claims 14 and 18, and further include infrared-reflective pigment in an amount so that there is essentially no transmittance of light of near infrared wavelength, as per claim 14.

In view of the preceding remarks, the 35 U.S.C. § 103 rejection based on Ravinovitch in view of Krafft and Sullivan should be REVERSED.

III. Stamper in view of Kraft cannot establish a *prima facie* case of obviousness for claims 7, 10, 11, 13, 16, 17, 25, and 26 as the combination is improper since Krafft is nonanalogous art, the references fail to teach or suggest the claimed film or layer thickness or the use of an amount of IR-reflective pigment that provides essentially no transmittance of IR light, and no apparent reason is provided by which a skilled artisan would be motivated to include the missing subject matter.

As noted in Section I above, it is improper to apply Krafft against the present claims as the reference is not reasonably related to the field of endeavor or the problem faced by Appellants. In particular, a person of ordinary skill in the art would not look to a reference providing a visible light proof seal for photographic film as used within a camera when constructing or modifying a layer containing infrared-reflective pigment.

The combination of Stamper in view of Krafft is therefore flawed and cannot serve as the basis for a case of obviousness.

However, even if Stamper is combined with Krafft, the collective teachings fail to disclose the claimed film or layer of about 2 mils to about 5 mils thick. In addition, these claims (with the exception of claims 16 and 17) include an amount of IR-reflective pigment that provides essentially no transmittance of IR light through the film or layer. Obviousness requires that the prior art references teach or suggest all the claim limitations and also requires some apparent reason, either from the cited references or the general knowledge in the art, upon which to base the alleged combination and modification of references. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (2007).

Stamper discloses a laminate of two layers. A first layer of vinyl chloride polymer containing Sb_2O_3 is cast or reverse coated on release paper. Next, a second layer of vinyl chloride polymer containing TiO_2 is cast or reverse roller coated on the first layer. The laminate can then be wound up on a take-off roll. Each layer of the laminate has a thickness of from about 12-50 mils, so that overall the laminate has a total thickness of from about 24-100 mils. Stamper col. 2, lines 21-41. Thus, the Stamper laminate, and notably each of the individual layers if taken alone, do not include a film or layer from about 2 mils to about 5 mils.

Stamper therefore fails to teach all the features of the present claims. It is also notable that a skilled artisan would not separate the layers in the Stamper laminate, so the laminate thickness of 24-100 mils stands in contrast to the presently claimed thickness. Specifically, the Stamper laminate must be considered as a whole. The

Sb_2O_3 acts as a fire retardant and the TiO_2 layer protects the Sb_2O_3 layer since in sunlight Sb_2O_3 adversely affects PVC. Stamper col. 1, lines 32-39. Thus, it is a goal of the Stamper reference to use the TiO_2 layer to protect the Sb_2O_3 layer from sunlight thereby protecting the PVC. Consequently, there is no apparent reason to separate the TiO_2 layer from the Sb_2O_3 layer and, in fact, Stamper is expressly teaching away from separating the layers. Therefore, the Stamper laminate of 24-100 mils does not render the present invention obvious, as the Stamper thickness is not the same as the film or coating layer of the present claims, which are about 2 mils to about 5 mils thick. Likewise, consideration of just the TiO_2 layer alone still fails to disclose the claimed thickness; the TiO_2 layer alone is 12-50 mils.

Even if the Krafft patent was analogous art, it does not teach or suggest vinyl capstock of any thickness whatsoever. Instead, the Krafft patent teaches photographic monosheet material that contains a light reflecting white pigment layer designed to reflect visible light in order to mask the image silver and form a light proof seal. Krafft abstract; col. 1, lines 4-5; col. 2, lines 49-50. Krafft simply stands for the proposition that increasing a pigment layer thickness can increase reflectivity; the reference is not trying to reduce heat build-up. Consequently, the straightforward combination of Stamper and Krafft is to increase the thickness of the Stamper coating if increased reflectivity is desired.

As such, applying the teachings of Krafft would at best result in increasing the thickness of the single TiO_2 layer from Stamper. The single TiO_2 layer has a thickness of from about 12-50 mils and increasing the thickness only moves the hypothetical combined product further away from Appellants' claimed thickness of about 2 mils to

about 5 mils. The reference combination therefore fails to include all of the claimed features and accordingly the rejection based on Stamper and Krafft fails to establish a case of obviousness.

The present invention provides the benefits of including the IR-reflective pigment in a thin film/layer (from about 2-5 mils) to effectively reduce heat build-up on the siding while at the same time minimizing the amount of material and IR-reflective pigment that must be applied to the siding, thereby reducing costs. Present application, page 2, lines 10-11. In addition, the present invention solves issues relating to tensile properties, among other properties, caused by concentrations of IR-reflective pigment that would be necessary to achieve the desired reflectance when the pigment is present throughout the vinyl siding. Present application, page 2, lines 11-14. The combination of Stamper in view of Krafft lacks any appreciation of these facets of the present invention and hence fails to provide any reason to selectively combine their features in order to approximate Appellants' claims. See *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (2007) (obviousness includes determining "whether there was an apparent reason to combine the known elements *in the fashion claimed by the patent at issue*" (emphasis added)).

In addition, Stamper does not provide any basis for the Examiner's suggestion that the TiO₂ layer provides essentially no transmittance of light of near infrared wavelength. Instead, the goal of the TiO₂ layer in the Stamper reference is protect the Sb₂O₃ layer from sunlight, since in sunlight Sb₂O₃ adversely affects PVC. There is nothing in Stamper to suggest that the amount of protection required for the Sb₂O₃ layer equates to no transmittance of light of near infrared wavelength. In fact, Stamper is

completely silent as to what type, level, or extent of protection is necessary to keep the Sb₂O₃ from adversely affecting the PVC.

A generally known problem with PVC is damage by ultraviolet (UV) light, and the TiO₂ layer is likely protecting the PVC substrate from the UV component of sunlight. See paragraph [0008] of US 2003/0008959 to Crabb et al. A skilled artisan would not infer or be motivated from the Stamper reference or elsewhere in the prior art that one can or should use an infrared reflective pigment in an amount to provide essentially no transmittance of light of near infrared wavelength. The issues of infrared-reflectance and reduction of heat-buildup are not even contemplated by the Stamper reference. What is more, Appellants' issue of heat build-up inside a house with siding is distinct from the Stamper patent's issue of avoiding degradation of PVC.

In sum, since the Stamper TiO₂ layer is thicker than the film and coating layer of the present claims and since Krafft simply says to make a layer thicker to increase reflectivity, there is no reason for a skilled artisan to modify the combined teachings to approximate Appellants' claims. In addition, Stamper and Krafft are completely silent as to providing a layer having essentially no transmittance of light of near infrared wavelength, and are at best focused on preventing the adverse effects of Sb₂O₃ on PVC. There is no teaching or suggestion, here or elsewhere, that preventing adverse effects of light plus Sb₂O₃ is synonymous with preventing IR transmittance. Consequently, there is no reason to re-engineer the reference to include an IR-reflective pigment in an amount so that there is essentially no transmittance of light of near IR wavelength. Accordingly, the present claims are not obvious and are patentable over Stamper.

In addition to the preceding remarks, Appellants submit the following rebuttal to Section (10) III of the Examiner's Answer, pages 10-12.

With respect to the Stamper reference, the single TiO₂ layer having a thickness of from about 12-50 mils (Stamper col. 2, lines 21-41) does not disclose a film or layer of about 2-5 mils. Modification of Stamper in view of Krafft would simply direct the skilled artisan to increase the thickness of the Stamper layer in an effort to obtain a film having essentially no transmittance of light of near infrared wavelength. Thus, the combination fails to disclose the claimed film or layer thickness and further fails to provide any reason or basis for a skilled artisan to modify the combined teachings to approximate Appellants' claims.

The Examiner's position that the titanium dioxide is necessarily adjusted to be included in sufficient amounts so that there is essentially no transmittance of light of near infrared wavelength through the film is unsupported. Nowhere does Stamper provide any basis or reason for such adjustment. Using a TiO₂ layer to protect a Sb₂O₃ layer teaches nothing about using the TiO₂ layer to reflect infrared light, much less providing essentially no transmittance of light of near infrared wavelength, or reducing heat build-up. Even if resistance to sunlight and protecting a Sb₂O₃ layer may inherently include some reflection of light of infrared wavelength, obviousness cannot be predicated on what is unknown and unappreciated. See *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981) (inherency may not be established by probabilities or possibilities and the mere fact that

a certain thing may result from a given set of circumstances is not sufficient). The Stamper reference therefore fails to provide any basis for a person of ordinary skill to provide a film having essentially no transmittance of light of near infrared wavelength through the film.

Finally, the Examiner cites U.S. Pat. App. Pub. Nos. 2003/0030041 and 2003/0103017, which are not part of the present rejection, as teaching general thicknesses of capstock. However, these references fail to cure the noted deficiencies as neither of these references discloses the claimed thickness or any reason to fashion a capstock of the claimed thickness. These two patent applications only disclose capstock of 0.2 mm, which equals 7.87 mils, and both are silent regarding infrared-reflecting pigment and reducing heat build-up and fail to provide any reason for reducing the thickness of the Ravinovitch capstock.

In view of the preceding remarks, the 35 U.S.C. § 103 rejection based on Stamper in view of Krafft should be REVERSED.

For these and the other reasons discussed above, Appellants respectfully request that the rejection of claims 7, 10, 11, 13, 14, 16-20, and 24-26 be REVERSED.

Respectfully submitted,

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Claims Appendix

7. A film prepared by applying to a substrate a plastisol composition comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the film, and coalescing the applied composition to produce the film, wherein the film is from about 2 mils to about 5 mils thick.
10. A film according to claim 7, wherein the film is flexible.
11. An article of architectural siding, comprising an outer coating layer comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the layer, wherein the layer is from about 2 mils to about 5 mils thick.
13. An article of architectural siding according to claim 11, wherein the article of architectural siding is a vinyl article.
14. An article of architectural siding according to claim 11, wherein the article of architectural siding is an aluminum article.

16. An article of architectural siding formed according to the method of:
- (a) forming a coating layer on a backing material by applying to the backing material a layer of a plastisol composition from about 2 mils to about 5 mils thick comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment and fusing the applied plastisol layer into a coating layer with heat;
 - (b) removing the coating layer from the backing material and laminating the coating layer to a piece of architectural siding material; and
 - (c) shaping the piece of laminated architectural siding material into a desired profile.
17. An article of architectural siding according to claim 16, wherein the article of architectural siding is a vinyl article.
18. An article of architectural siding according to claim 16, wherein the article of architectural siding is an aluminum article.
19. A coated article, comprising at least one coating layer comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the layer, wherein the article is a piece of vinyl siding or a trim piece for vinyl siding and the layer is an outer layer from about 2 mils to about 5 mils thick.

20. An article having thereon a layer of a plasticized poly(vinyl chloride) polymer, the layer further including an infrared reflective pigment in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the layer, wherein the article is a piece of vinyl siding or a trim piece for vinyl siding and the layer is an outer layer from about 2 mils to about 5 mils thick.

25. A film according to claim 7, wherein the film is a roll of film.

26. A film according to claim 7, wherein said substrate is paper.

Evidence Appendix

There is no evidence submitted pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132.

Related Proceedings Appendix

There have been no related appeals and interferences and therefore no related decisions exist.